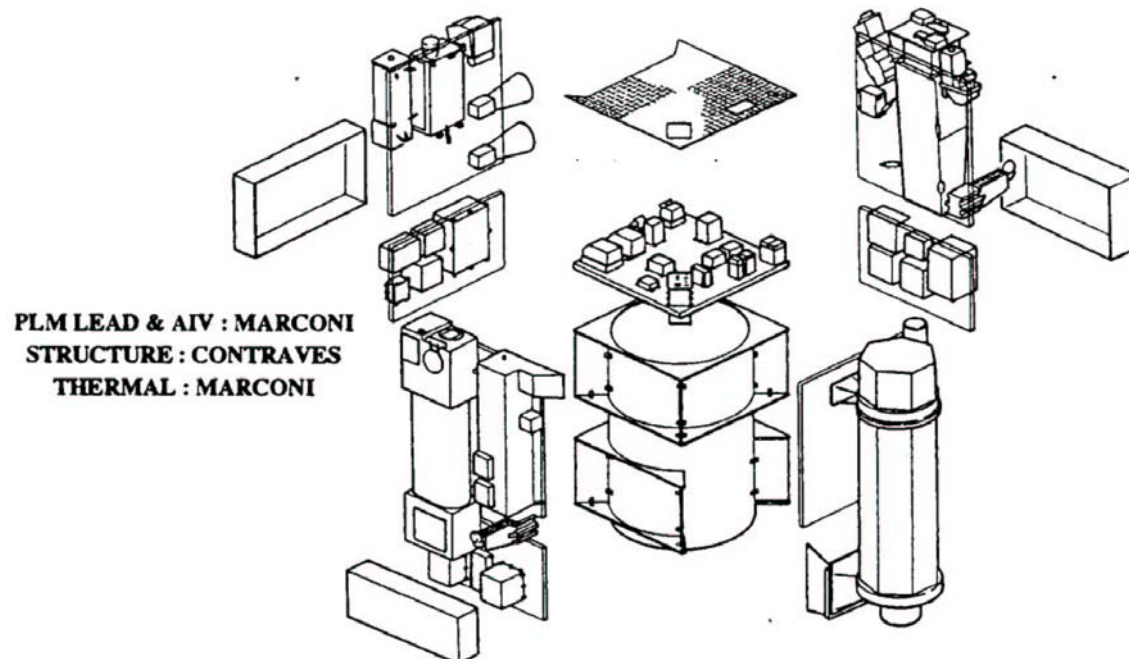


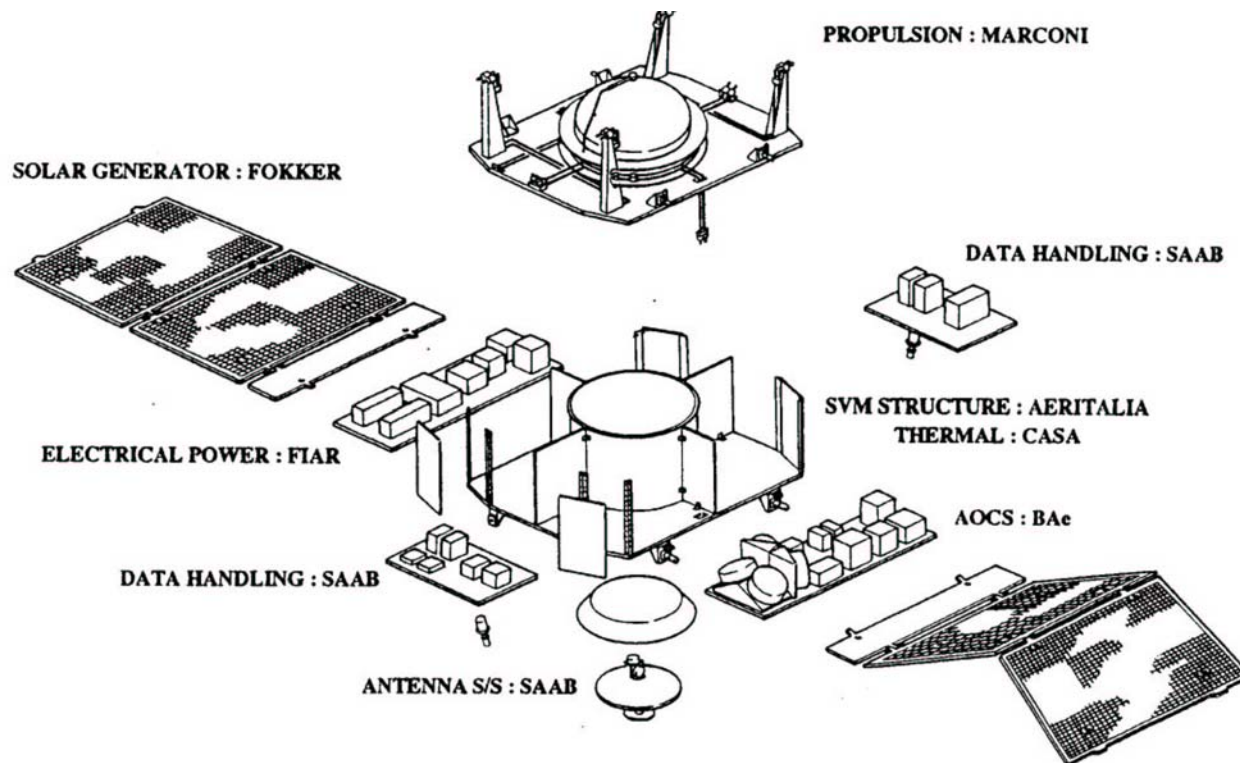
SOHO Award

Academy Day
Bremen, 28 Sept 2003

SOHO Payload Module



SOHO Service Module



SOHO : *A Challenge for Industry*

- A technical challenge :
 - First european spacecraft in L1 halo orbit
 - Stringent pointing accuracy and stability (instrument line-of- sight to sun)
 - Stringent cleanliness requirements
 - Very large payload over spacecraft mass ratio
 - Autonomy to cope with 8 hours per day operations
- An interface management challenge :
 - 11 instruments, all exceeding state-of-the-art technology
 - 11 instruments, built by consortia of labs
 - 11 EGSE's, all different, to operate the payload
 - « Unusual » (for us) operations interface with GSFC control center
 - « Unusual » (for us) launch vehicle operations

SOHO : *A real Europe – USA Achievement (1)*



- The technical challenge was met, and more :
 - The whole thing requested an enormous energy from start to completion
 - We had technical difficulties, as any project but not more than other projects
 - The spacecraft had and still has marvellous in-orbit performances
- 8 years after launch, only two bad souvenirs remain :
 - August 1995 with the reaction wheels saga
 - January 1998 with the temporary loss of the spacecraft.

SOHO : *A real Europe – USA Achievement* (2)



- The interface management challenge was met, and more :
 - Very good collaboration with PI's teams during all integration and test sequences, in Portsmouth and in Toulouse
 - Very good collaboration with NASA operations team in GSFC (once the teams really started to work together)
 - Very good launch site and launcher operations collaboration in Kennedy Space Center
- The launch campaign in itself was a real challenge :
 - Full strip of the payload to retrofit most of the instruments
 - Retrofit of many service module equipment (wheels)
 - The Matra Marconi Space team did a full spacecraft integration sequence in Florida, spending nearly 6 months in Cocoa Beach with no workmanship environmental testing at spacecraft level...

SOHO Status : 8 years later (1)

- Few failures occurred, most probably linked to deep freezing during the loss period
- None of the failures significantly affect the science data collection
 - Loss of fast loop of receiver 1 April 97
 - Loss of all 3 gyros Sept/Dec 98
 - Loss of battery 1 March 02
 - Z motor of HGA stuck May 03

(in fact it is still possible to move the antenna along Z axis with double coil activation)
- All other equipment/subsystems work fine including the solid state memory, introduced late in the programme.

SOHO Status : 8 years later (2)

- Spacecraft resources are ample :
 - Low solar array degradation (1.83% per year average, ie. 14,18% in 93 months)
Margin in peak current in still > 11A
 - Low fuel consumption (120 kg of hydrazine still available)
(starting at 250 kg, 40 kg used for orbit acquisition, 60 kg used in 1998, nominal use is few kg per year)
 - Reaction wheels, problematic on-ground, are still in very good shape (nominal friction torque) after 8 years of operations.
 - Thermal protection degradation is low : all temperatures are still within design limits.

Conclusion

- SOHO was indeed for industry a very challenging but exciting project
- SOHO industrial team got full reward thanks to very good spacecraft performances
- « Those who were so proud to have built SOHO, are even more proud to have contributed to its recovery »
- We all wish many years to SOHO good science operations and we do not see reasons for anything else, but as anyone SOHO is getting old !